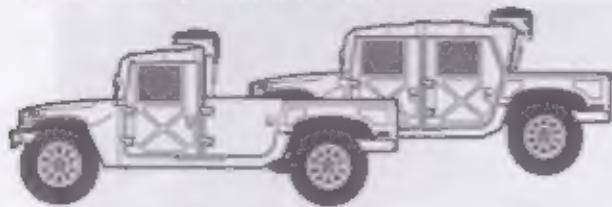


M998 / M1038



# Air Conditioner for HMMWV with Add-On Armor

## RD-2-4114-0 & RD-2-4233-0 INSTALLATION INSTRUCTIONS

Install refrigerant compressor per instructions provided with compressor mount kit.

### TOOLS REQUIRED

#### SYSTEM INSTALLATION

- Uni-bit step drill up to  $\frac{1}{4}$ " diameter or  $\frac{1}{4}$  inch,  $\frac{1}{8}$ " and  $\frac{3}{16}$ " drills/hole saws
- $1\frac{1}{4}$ " hole saw
- Power drill that will accept drill bits and hole saws listed above
- No. 2 phillips screwdriver bit for drill, 2 inch long
- No. 2 phillips screwdriver
- Ratchet
- Breaker bar
- 5 inch extension
- 10mm socket
- 13mm socket
- $\frac{1}{4}$ " socket
- 8mm nut driver or socket with nut driver handle
- De-burring tool or small rat tail file
- Pocket knife
- Scissors
- 16 oz. hammer
- Center punch
- 5/8" open end wrench
- $\frac{1}{4}$ " open end wrench
- $\frac{3}{8}$ " open end wrench
- $\frac{1}{2}$ " open end wrench
- $1\frac{1}{8}$ " open end wrench
- 10mm open end wrench
- 13mm open end wrench
- Hose fitting crimp pliers (supplied in A/C kit)
- Hose cutter or knife (supplied in A/C kit)
- Duct tape
- M10x1.5 tap with handle or brush
- Needle nose pliers
- Hack saw (2 door and ring turret only)
- Wire cutters

#### REFRIGERANT CHARGING EQUIPMENT

- Charging gauges and scale or charging station
- Vacuum pump
- R-134a refrigerant

Before starting installation review parts list included in kit to verify that all required parts needed for installation were received.

### PARTS NOT USED

This kit is designed to fit several but not all configurations of HMMWV. As such, not all parts will be used on all applications and some installations may require modifications to fit differing vehicle configurations. Some small, inexpensive but critical spare parts have been included in case of loss or damage during installation. The following is a list of parts that may not be required on some vehicles.

#### Not used on two-door

- Upper evaporator support brackets
- M-8 nylon lock-nuts
- #6 straight female fitting
- 2.5" square ducting

#### Not used on four-door

- #6 45° female fitting

#### Not used for two-door, 1 only used on four-door

- 8-pillar clamps

#### Not used on two-door or ring turret

- Duct saddle

#### Not used on two- or four-door

- 3" flex hose
- Four additional band clamps

#### Not used for 2 door, only 4 used for four-door

- M5x16mm screws

#### Spares included

- Hose fitting cages and clips
- O-Rings #6, #8 & #10

#### Not used on ANY M998 / M1038

- 1025 condenser mounting brackets (2)
- #6 90° male fitting
- MB screws (8)
- Flat washers (8)
- M8 nylon locknuts (8)
- 1025 receiver drier bracket

#### Not used on A-1

- #8 90° female fitting

#### Not used on A-2

- #8 45° female fitting

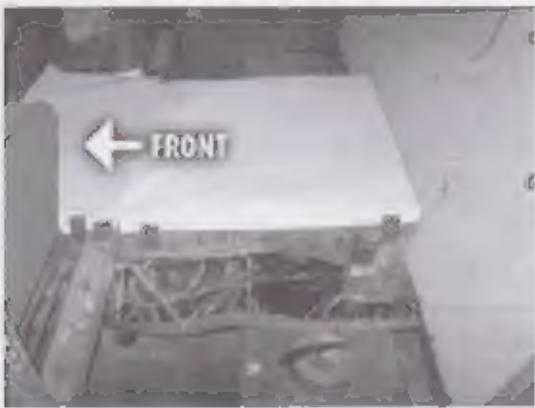
### CONCURRENT TASKS

Air conditioner current draw is approximately 20 amperes. At minimum, a 100 ampere alternator is required for vehicles with air conditioner and communications equipment. Verify the alternator has a rating of 100 amperes or higher. If alternator will be upgraded to allow installation of A/C, some tasks can be performed simultaneously to avoid repeating tasks.

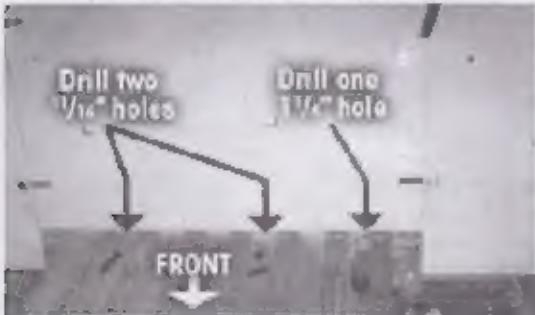
- Removal and replacement of belts for alternator and A/C compressor.
- Disconnect/re-connect battery.
- Route and attach power cable from alternator to battery compartment.
- Check power steering, waterpump and crankshaft pulleys for wear. Replace if needed. Uneven wear will prevent proper belt tensioning.



## EVAPORATOR AND CONDENSER MOUNTING



1. If present, remove plywood panel from between seats on top of transmission tunnel. Remove top screws attaching driver's side mat to side of transmission tunnel. Place drill template on transmission tunnel and tape into position. Before drilling, ensure nothing will be damaged by drill on underside of transmission tunnel. Drill two  $\frac{1}{16}$ " (0.0625 inch) diameter holes and one  $1\frac{1}{16}$ " (1.25 inch) diameter where required then de-burr for side of panel.



2. Remove front passenger seat to expose battery box. As needed, remove either auxiliary power panel or batteries to gain access to drill hole in battery box. Drill  $\frac{1}{4}$ " diameter hole in rear battery box panel near top inboard edge. Install grommet.



3. This step is for four-door vehicles only; for two-door vehicles skip to Step 4. Remove rear curtain from three lower quarter trim fasteners and side curtain from two lower quarter trim fasteners on rear b-pillar, both sides.



4. Pull rear curtain down tight over rear of armor plate. Mark and cut four crosses over the bolts and nuts attaching the center armor plate to the rear side plates. Cut crosses just large enough for nut to push through.



Cut rear curtain in four places to allow nut and bolt to protrude

5. Attach lower support bracket to evaporator unit "L" brackets using two M8x1.25x25mm bolts, two flat-washers and two M-8 nylon lock-nuts.



6. Attach upper clamp brackets.

a. For four-door vehicles: loosely attach the upper clamp brackets to the upper support brackets on the evaporator unit using four M8x1.25x25 bolts, four M8 flat-washers and four M8x1.25 nylon lock-nuts.



b. For two-door vehicles: remove and discard the two upper support brackets from the evaporator unit (save bolts). Loosely attach the upper clamp brackets to the back of the evaporator unit using four M8x1.25x25 bolts.



7. Remove two lower center 15° bolts attaching rear center armor plate to rear side armor plates. Hang evaporator unit from inside top of armor plate (above holes drilled in transmission tunnel). Adjust side to side position to align slots in lower support bracket with slots in center armor plate.



8. Tighten evaporator unit top clamp bracket bolts.



9. Insert new  $\frac{1}{2}$  -13x2 1/2" bolts with flat washers and 2  $\frac{1}{4}$ " oversize washers through lower evaporator support bracket, armor plates, rear curtain and condenser mount angle. Install flat-washers, and nylon lock-nuts (just snug).



**a. For vehicles equipped with four-door armor kits**  
use slot nearest end of condenser mount angle. Mount angles with top gusseted section facing inward toward rear center of vehicle and perpendicular side (with two .531 inch diameter holes) facing outward. Tighten bolts just snug



**b. For vehicles equipped with two passenger armor kits**  
use second slot from end of condenser mount angle. Mount angles with top gusseted section facing inward toward rear center of vehicle and perpendicular side (with two .531 inch diameter holes) facing outward. Tighten bolts just snug.

**c.** Make sure bar in bottom of rear curtain is below condenser mount angles and not between angles and armor plate.



**10.** Remove two top center  $\frac{1}{2}$ " bolts attaching rear center armor plate to rear side armor plates.

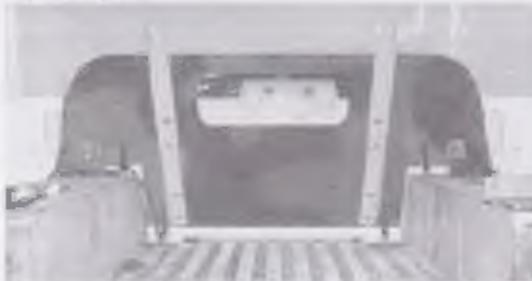
**11.** Loosely attach evaporator side brackets to evaporator unit with original hardware. Position condenser mount angles over top slots in rear center armor plate. Install new  $\frac{1}{2}$ -13x2  $\frac{1}{2}$ " bolts with flat-washers and 2  $\frac{1}{2}$ " oversize washers through evaporator side brackets, armor plates, rear curtain and condenser mount angles. Install flat washers and nylon lock-nuts. Tighten just snug



4-Door Mounting Configuration shown above and below



**12.** New  $\frac{1}{2}$ -13x2  $\frac{1}{2}$ " bolts should be loose enough to allow side to side position of condenser mount angles to be adjusted by hand



13. Drill 1 1/2 inch diameter hole for condenser hose.

- For four-door vehicles, drill hole in bed floor between wheel well and drivers side vertical condenser mount angle, forward of rear curtain hook. De-burr hole.



- For two-door vehicles, drill hole in transmission tunnel near drivers side vertical condenser mount angle.

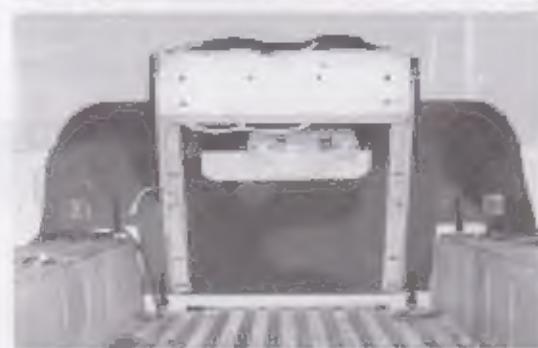


14. To prevent cargo from sliding forward in bed and damaging hose, place hose guard in recessed channel of bed behind 1 1/2" hole drilled in Step 13 above. Drill 1/4" diameter hole in bed using guard as drill guide. From underneath vehicle, insert M6x22mm washer head screw with 1 1/8" O.D. washer through hole in bed and attach guard with M6 nylon lock-nut.



15. Attach condenser assembly to condenser mount angles with 1/2-13x1.5" bolts, flat-washers and nylon locknuts. Adjust side to side location of angles if necessary. Note there are three holes in condenser assembly bases to allow for horizontal mounting of condenser with vertical plates of two-door armor and 15" angled rear plate of four-

door armor kits. Install top bolt first, then install lower bolt after positioning condenser horizontally.



16. Tighten all mounting hardware on condenser mounting and evaporator unit mounting.

17. **Four-door only** Attach side curtain to rear curtain with M-6 x 22mm bolts through the grommets and secure with flat-washers and M-6 nylon lock-nuts. Cut small holes in side curtains in line with third grommet in rear curtain. Attach side curtain to rear curtain by pushing M6 x 22 washer head screws through cut in side curtain then through third grommet in rear curtain. Secure with flat-washers and nylon lock-nuts.



## AEROQUIP® E-Z CLIP ASSEMBLY INSTRUCTIONS

### Cut the Hose

Cut the hose to proper length with an appropriate cutting tool. Aeroquip's hand-held cutter (79R8920) has been specially designed for cutting all non-wire reinforced hose. Be sure the cut is made square to the hose length.



### Slide Two Clips on the Hose

Slide two clips (be sure to use the correct size) onto the cut end of the hose. The orientation of the clips does not affect the performance of the connection. However, for ease of assembly, both clips should be oriented in the same direction. NOTE: If you don't slide the clips over the hose at this time, you will have to stretch the clips over the hose and fitting later. This may permanently damage the clip.



### Oil the Nipple



Lubricate the nipple with a generous amount of the refrigeration or A/C system's compressor lubricating oil. This MUST be done to lower the force of nipple insertion.

### Insert the Nipple into the Hose

Insert the nipple into the hose. To ensure that the nipple is fully inserted, check the gap between the cut end of the hose and the shoulder of the nipple. Care should be taken to avoid kinking or other damage to the hose during this step. NOTE: Be sure to wipe excess oil from the nipple and hose.



### Snap on the Cage

Snap the cage into the groove on the nipple. The arms of the cage should extend over the hose-covered length of nipple. When the cage has been correctly installed in the cage groove, the cage will be able to rotate in the groove. This step MUST be performed to ensure that:

1. The clips will be located over the O-Rings on the nipple.
2. the connection will be compatible with the connection's pressure rating.



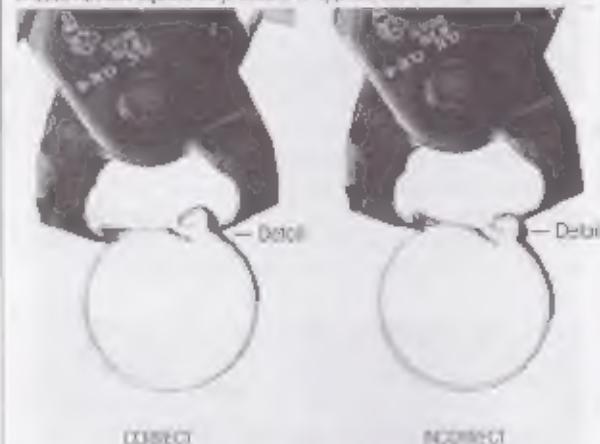
### Position the Clips

Slide the clips over the cage arms and into the channels on each arm of the cage.

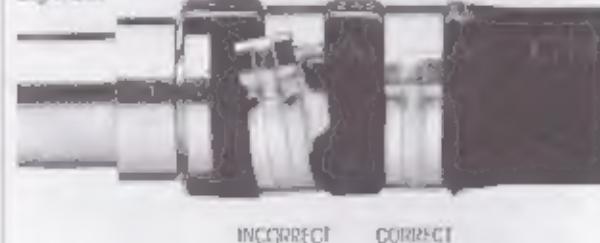


### Close the Clips

Using the Connecting Tool (79R8920) to close the clips. The tool should be positioned squarely on the clip connection points and should remain square as pressure is applied and the clip is closed.



The nose of the plier should be firmly seated under the assembly bump and lock latch. If the pliers are not kept square as you close the clip, the clip may have an offset. Use the pliers to correct the clip alignment.



NOTE: E-Z Clip components should not be reused.

## REFRIGERANT HOSE ROUTING

**Note:** It is imperative that dirt and moisture be kept out of the air conditioning system. Small amounts of debris or moisture can make the system inoperable. Keep all fittings capped until just prior to connecting hoses. Keep ends of hoses covered during routing to avoid contamination.

Do not allow hoses to be kinked or come in contact with high heat items such as engine exhaust pipes. Vibration can damage hoses and cause loss of the refrigerant charge. Secure hoses to avoid movement that may cause abrasion and keep hoses away from sharp edges. Use black nylon spiral wrap where needed to protect hoses.

Before connecting fittings check to see that o-rings are present and undamaged. Lubricate o-rings with mineral oil provided just prior to connecting fittings to components or inserting fittings into hoses.

1. Remove screw on caps from ports on top end of receiver/drier. Lubricate o-rings with mineral oil. Attach pressure switches to ports. Switches can be installed on either port.
2. Install receiver/drier on drivers side condenser mount angle with band clamps provided. Bend end of band clamp into a slight radius before inserting into small slots in condenser mount angle gusset. This will allow the end of the clamp to slip out of the other slot in gusset.



3. Position receiver/drier with inlet (male fitting) under condenser fittings and outlet (female fitting) pointing over top of bumper plate. **Note: Do not leave drier un-capped for more than just a few minutes as it will absorb moisture out of the air and become unusable.** Connect condenser harness to pressure switches on receiver/drier. Pressure switch wire connectors are different and must be connected to the correct switch. If it doesn't snap on with minimal pressure try the other switch.



4. Trim end off cone grommet to achieve snug fit around #8 hose. Install grommet in hole in bed/transmission tunnel. Tape closed ends of hose to keep debris out of hose.



5. For four-door configuration: Route #8 hose through grommet then forward along frame rail. Route hose outboard of parking brake linkage, then up into engine compartment near oil filter and dipstick. Soapy water will ease routing of hose through grommet. Allow for extra hose at each end. Do not cut hose or connect fittings yet.



**b. For two-door configuration:** Route #8 hose through grommet then forward along the frame rail. Route up into engine compartment near oil filter and dipstick. Soapy water will ease routing of hose through grommet. Allow for extra hose at each end. Do not cut hose or connect fittings yet.



**5.** Trim end off cone grommet to achieve snug fit around #12 hose. Install grommet in hole in transmission tunnel (under evaporator unit). Tape closed ends of hose to keep debris out of hose.

**a. For four door configurations:** route #12 hose through grommet then forward along frame rail. Route hose outboard of parking brake linkage, then up into engine compartment near oil filter and dipstick. Soapy water will ease routing of hose through grommet. Allow for extra hose at each end. Do not cut hose or connect fittings yet.



**b. For two door configurations:** route #12 hose through grommet then forward above driveshaft. Route up into engine compartment near oil filter and dipstick. Soapy water will ease routing of hose through grommet. Allow

for extra hose at each end. Do not cut hose or connect fittings yet.



**6.** Route #8 and #12 hoses over engine and behind air intake duct to passenger side of engine then forward to compressor.

*Refer to photo at bottom, opposite*

**7.** Using nylon tie straps, secure hoses under vehicle and along firewall. Avoid high heat surfaces, sharp edges and moving parts of vehicle. Keep hoses tucked up high enough to keep them from being snagged as vehicle drives over obstacles or brush. Hoses should span no more than 2 feet without being secured. **For four door configurations:** secure hoses to top of frame rail by joining two large nylon ties together and wrapping around hoses and frame rail. Do not over tighten and collapse hoses.

**8.** After securing hoses, lubricate o-rings and install #10/12 straight male fitting into expansion valve and #10/12 90° female fitting to compressor (hand tight only). Be sure hood of vehicle will close and air intake duct can be re-installed over compressor. Trim ends of #12 hose to length and crimp onto fittings. Lubricate fittings prior to inserting into hose.

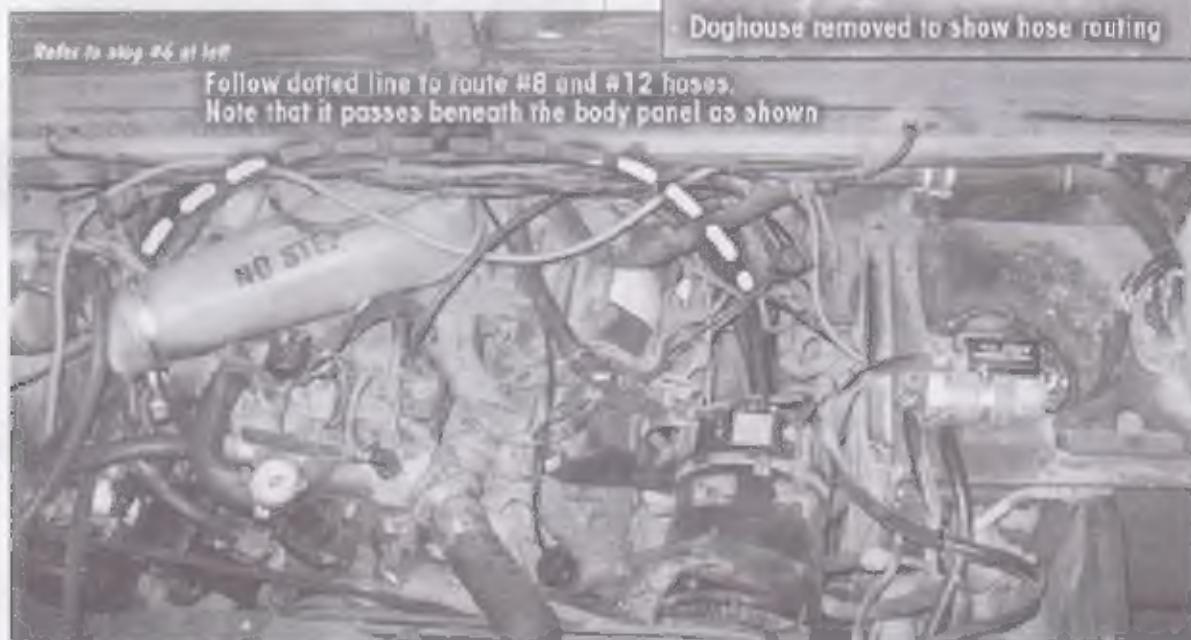
*See hose/fitting assembly instruction on page 6...*

**9.** After securing hoses, lubricate o-rings and install #8 straight female fitting on condenser inlet (larger fitting of condenser). Depending on installation requirements connect a 45° or 90° female fitting onto compressor (hand tight only). Be sure hood of vehicle will close and air intake duct can be re-installed over compressor. Trim ends of #8 hose to length and crimp onto fittings. Lubricate fittings prior to inserting into hose.

10. Tighten fittings of #8 and #12 hose onto compressor, condenser and expansion valve.
11. Lubricate o-rings and install #6 male stainless tube with two 90° bends into expansion valve on evaporator unit (hand tight only). Cut hole in rear curtain for receiver/drier outlet tube and condenser wire harness. Lubricate o-rings and attach single bend #6 male stainless tube into outlet of receiver/drier over top of armor plate and towards tube in expansion valve (hand tight only). Align tubes so that they can be connected with hose. Adjust finer position for ease of hose routing if necessary.



12. Condenser to receiver/drier. Lubricate o-rings and install #6 90° female fitting on inlet of receiver/drier.
- c. **For four-door configuration:** Lubricate o-rings and install #6 straight female fitting on outlet of condenser (smaller #6 fitting).



Doghouse removed to show hose routing

**b. For two-door configuration:** lubricate o-rings and install #6 45° female fitting on outlet of condenser (smaller #6 fitting).



**c.** Adjust drier position for ease of hose routing if necessary. Cut sections of #6 hose to connect condenser to receiver/drier and receiver/drier to expansion valve on evaporator unit. Lubricate fittings prior to inserting into hose. Crimp hose onto fittings. Tighten fittings to condenser, receiver/drier and expansion valve.

**d.** Remove cardboard sheet protecting fins on underside of condenser.

**13.** Cut drain hoses to reach from bottom of evaporator unit to top of transmission tunnel (1/4" diameter holes). Install rubber duck bill fittings onto drain hoses with plastic connector. Attach drain hoses to drain tubes on bottom of evaporator unit. Push duck bill fittings into 1/4" holes.

**14.** Reinstall plywood panel on top of transmission tunnel by notching around drain hoses and refrigerant lines.

## ELECTRICAL CONNECTIONS

**Note:** Disconnect battery to avoid electrical short circuits or accidental startup.

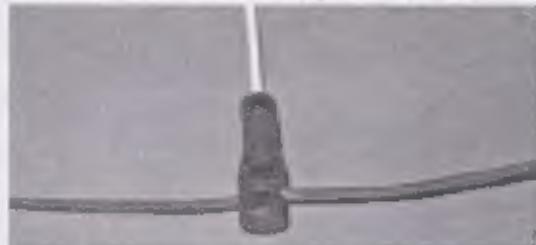
1. Remove screws attaching instrument cluster panel to dash board.
2. Attach air conditioner control panel to dash board using four self-drilling sheet metal screws provided in the kit. Make sure rubber grommet is in slot of metal box to protect wires.



3. Route short two-wire extension from control panel wire harness through gap under dash (rear heater switch) up into instrument cluster compartment.



4. Locate ignition controlled power wire supplying power to vehicle heater switch. It will be the center wire labeled "27D" on the switch. Remove larger end cap from posi-lock T-splice connector and attach to wire 27D about 4" from heater switch. Remove smaller end cap from posi-lock connector and attach white wire from control panel extension.



5. Connect black wire with white stripe to compressor. Route compressor wire over the engine along the firewall then through hole in firewall adjacent to dash panel. Connect to black wire with white stripe from control panel extension using posi-lock end splice connector. Secure wire with nylon tie shops.

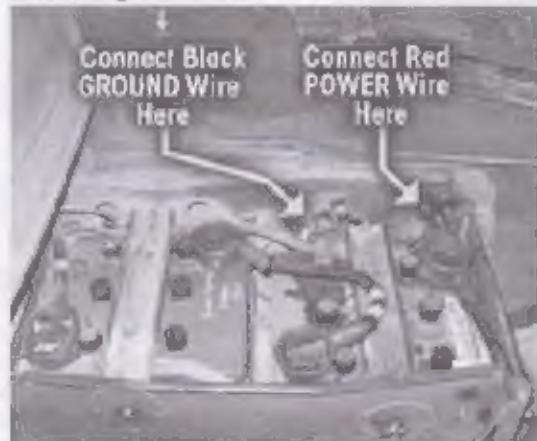
6. Connect condenser harness to evaporator unit harness. Secure wires to refrigerant hose with nylon tie straps.
7. Connect control panel harness to evaporator unit harness. Route wires along edge of transmission tunnel under drivers side mat. Secure harness to #12 refrigerant hose with nylon tie strap near top of transmission tunnel. Cut notch in mat for hose and reinstall screws attaching mat to transmission tunnel. Secure wire where required elsewhere using nylon tie straps.



8. Connect power and ground wire harness to evaporator unit harness. Route across transmission tunnel to passenger side.
  - a. For two passenger configurations, route wires through grommet directly into battery box.
  - b. For four passenger configurations, route wires forward along transmission tunnel then through grommet into battery box.
  - c. Secure wires along routing using nylon tie straps. If nothing is present to secure wires to, use tie wraps with a  $\frac{1}{4}$ " hole and philips washer head, self drilling screws. Be sure nothing will be damaged on opposite side of panel when screws are installed. **Caution: Fuel tank is directly under passenger side of transmission tunnel on four passenger configurations.**



9. Route red wire to  $\frac{1}{8}$ " inch 24VDC positive terminal and black wire to Philips head screw on negative ground shunt. Check voltage at red and black wires.



## AIR DISTRIBUTION DUCTING

### 1. For two-door configuration:

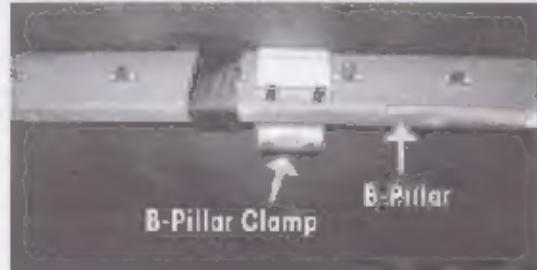
- a. Cut off male end of 90° elbows so that the elbows fit over the square outlets on the plastic plenum. Attach 90° elbows to plenum.



- b. Turn fan on and check air delivery. Adjust as required. When acceptable, apply a generous quantity of PVC cement to the mating surfaces of both parts and secure with philips washer-head screws to permanently attach elbows.

### 2. For four-door configuration without ring tunnel:

- a. Attach square ducting to plenum. Using support brackets provided, clamp ducting to b-pillar.





- b.** Attach 90° elbows to forward end of ducts to turn air toward driver and front passenger.
- c.** Turn fan on and check air delivery. Adjust as required. When acceptable, apply a generous quantity of PVC cement to the mating surfaces of both parts and secure with philips washer-head screws to permanently attach elbows.
- 3. For configurations with ring turret:**
  - a.** Attach flex-hose to plenum with band clamps provided in kit. Pre-bend band clamps and flex-hose into 2 5 inch square. Do not over-tighten and collapse duct. Route flex-hose outboard around ring turret then forward. Attach with nylon tie straps. Do not over-tighten nylon tie straps and constrict air flow through flex hose.

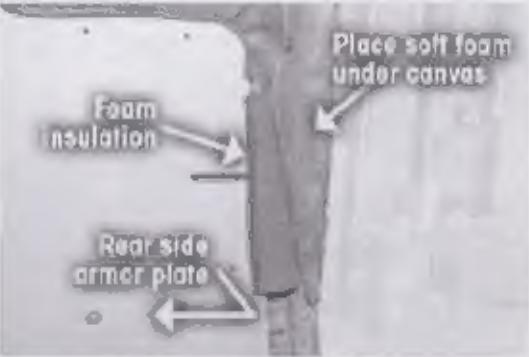
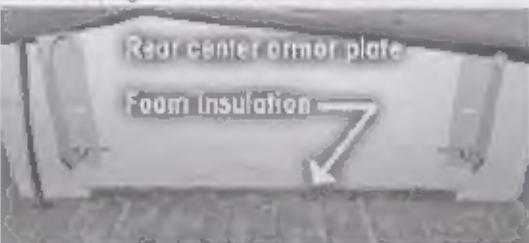


- b.** Cut two 8" sections of square ducting. Attach 90° elbows with louvers to one end of each 8" section. Apply a generous quantity of PVC cement to the mating surfaces of both parts and secure with philips washer-head screws to permanently attach elbows. Attach 3" flex hose to end of duct. Use Philips washer-head screws to secure duct to clamps. Turn fan on and check air delivery. Adjust as required. Attach ducts with louvers.

In desired locations using b-pillar clamps and M5x16 washer head screws.



- 4.** Using foam provided in kit and duct tape if available, seal as many cab air leaks as possible. This will keep cool air inside the cab and will help keep dust out that will eventually plug the air conditioner intake filter.



## CHARGING REFRIGERANT SYSTEM

Charging must be done by a certified A/C technician. Charge fittings are inside the cab near the expansion valve on the evaporator unit.

Refrigerant	R 134a	Compressor oil	PAG SP15
Refrigerant charge	4 Lbs	Oil charge	270 CC (supplied in compressor) (new system)



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